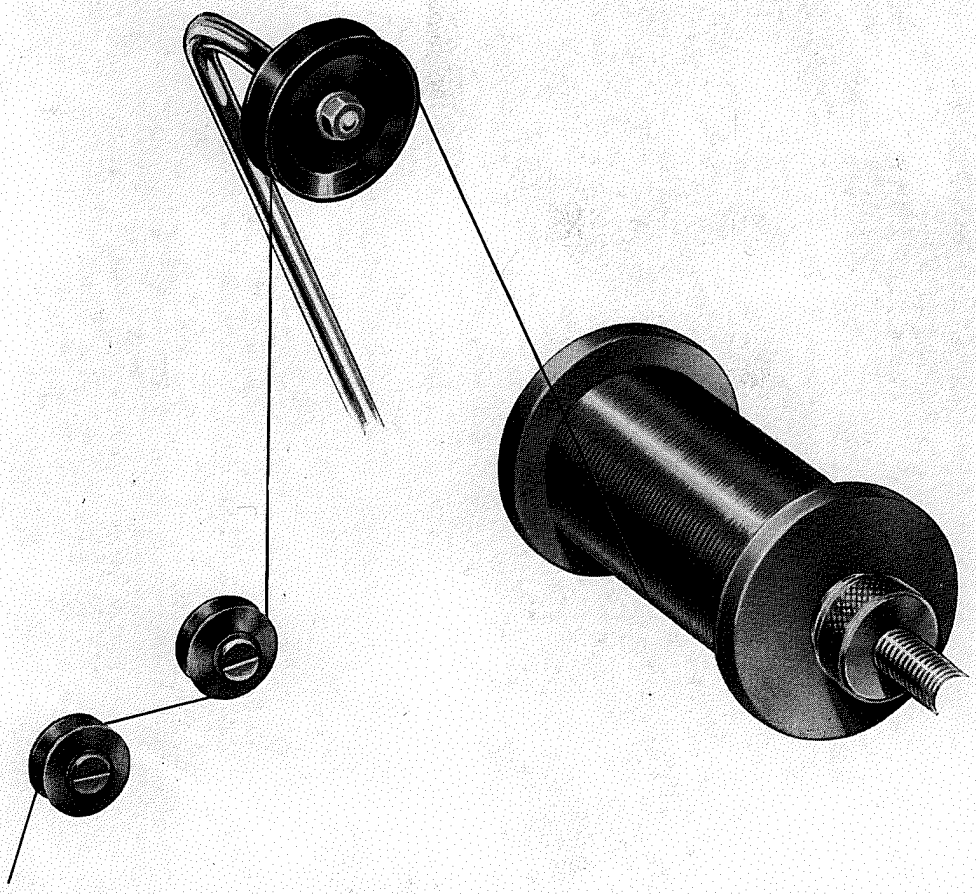
"DOUGLAS"

# REEL CARRIERS



## INSTALLATION · OPERATION · MAINTENANCE

AND PARTS LIST

"DOUGLAS"

# INSTRUCTIONS FOR ORDERING SPARE PARTS.

WHEN ordering spare parts the following suggestions, if observed, will save unnecessary delays caused by correspondence arising from inadequate descriptions.

1. The type of the Reel Carrier should always be quoted on the order, e.g. " DOUGLAS " *Standard* Reel Carrier etc., and the part numbers and descriptions of the parts required listed ; these are shown on the plates.
2. If the desired part is not shown in the illustrations or indicated on the parts list, a complete description must be given, and where possible a pattern or sketch should be sent.

When improvements are made in the design of any type of Reel Carrier and the parts are interchangeable, the latest type of part will always be supplied, unless the order states that the parts must be the same as already fitted. In this case the date of purchase and source of supply should be given.

The Company retain the right to alter any design without notification, and guarantee against faulty workmanship only those parts manufactured by themselves.

Overseas users of " DOUGLAS " Coil Winding Machines should address their enquiries to the Company's Agents in their country. Users in the United Kingdom should write direct to the address below.

THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO. LTD.
WINDER HOUSE, DOUGLAS STREET, LONDON, S.W.1
*Telephone : Victoria 3404 (8 lines).* *Telegrams : AUTOWINDA, SOWEST, LONDON*

Contractors to the ADMIRALTY, WAR OFFICE, AIR MINISTRY, POST OFFICE, MINISTRY OF SUPPLY, CROWN AGENTS for the COLONIES, and ELECTRICAL and TELEPHONE MANUFACTURERS throughout the World.

# MANUAL OF INSTALLATION, OPERATION AND MAINTENANCE

**THIS instruction and spare parts manual is intended to cover all types of "DOUGLAS" Reel Carriers.**

## — INDEX —



### LIST OF PLATES

# "DOUGLAS" STANDARD REEL CARRIER

The "DOUGLAS" Standard Reel Carrier illustrated on Plate No. 1 is supplied as an accessory with many of the bench type "DOUGLAS" Coil Winding Machines. It may, however, be purchased as a complete assembly as illustrated, or Reel Carrier or Stand may be purchased separately.

Wires from 47 s.w.g. (0·002″ — 0·05 mm.) diameter to 28 s.w.g. (0·0148″ — 0·38 mm.) diameter can be de-reeled when coils of round, square or rectangular section have to be wound, providing the following two points are carefully observed :—

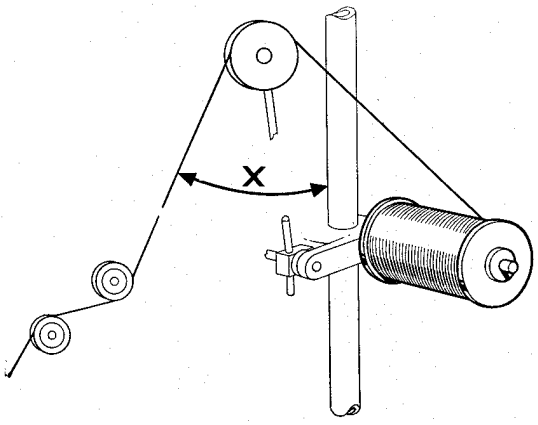
(*a*) Rectangular coil section must have sides within the ratio of 2 to 1.

(*b*) The Wire Supply Reel should be in accordance with the British Standards Institution Specification, No. 1489, Table 2 (an extract is reproduced on Page 8). The reason for this is that Reels having an excessive gross weight cannot be adequately controlled.

When multiple coil winding has to be carried out, up to four "DOUGLAS" Standard Reel Carriers can be mounted on one Stand.

## POSITIONING THE REEL CARRIER ON THE BENCH

The "DOUGLAS" Standard Reel Carrier assembly should be secured to the bench at the back of the Machine so that the angle "x" shown on the accompanying sketch is between 60°—80° and the Pulley, item 4, in the centre of the total traverse width. The Reel Carrier may be positioned on the tube by loosening the Clamping Screw at the back of the Reel Carrier Frame; it should be arranged as near to the top of the tube as practicable.




## SETTING THE TENSION

The Wire Supply Reel must first be placed on the Main Spindle, Item 5, so that the wire comes from the top of the Reel when unwound; the Loose Cone, Item 6, is then replaced on the spindle and the Quick Release Nut, Item 7, is pushed along the spindle up to the Loose Cone and tightened, thus clamping the Supply Reel.

The wire is then drawn from the Reel and passed over the Pulley, Item 45 (the Pulley Arm, Item 4, is held in a clamping block, Item 10, which may be adjusted to bring the Pulley approximately opposite the centre of the Reel). The tension may now be adjusted and adjustment will be simplified if the following instructions are noted :—

The Pulley Arm, Item 4, when pulled down actuates a Cam, Item 20, which releases the Bottom Brake, Item 23, from the Drum, Item 27, which controls the over-run of the Reel. The Spring, Item 25, returns the Pulley Arm to its neutral position and is adjusted according to the gauge of wire being de-reeled.

The Upper Brake Spring, Item 29, is adjusted by means of the Adjusting Screw, Item 39, and when applied this gives the initial brake tension. Hence the procedure of adjusting the tension for a particular gauge of wire is thus :—all the tension on the Bottom Brake Shoe should be reduced so that it falls away from the Drum. A weight equivalent to the wire being de-reeled, see Table, Page 9, is hung on the end of the wire and tension applied to the Upper Brake Spring by means of the Adjusting Screw, and to the return spring for the pulley arm by means of the Adjusting Stud, Item 26. When these are correctly set the weight should fall gradually. The Bottom Brake Shoe is then brought up until it just touches the Drum; this will set the correct over-run for the wire and winding may be commenced.

## MAINTAINING THE REEL CARRIER

It is important that the Main Spindle, Item 5, should rotate very freely and from time to time this must be dismantled, and the Ball Race, Item 13, cleaned and re-lubricated with a fine grade oil. This instruction applies also to the Pulley, Item 45, which should be examined for wear, as this may damage the covering of the wire.

Care should be taken to see that the Upper and Lower Brake Leathers are kept free from dust, dirt and oil. If dust or dirt are allowed to collect on these parts erratic tension will result and rapid wear of the drum will take place.

# "DOUGLAS"
# UNIVERSAL REEL CARRIER

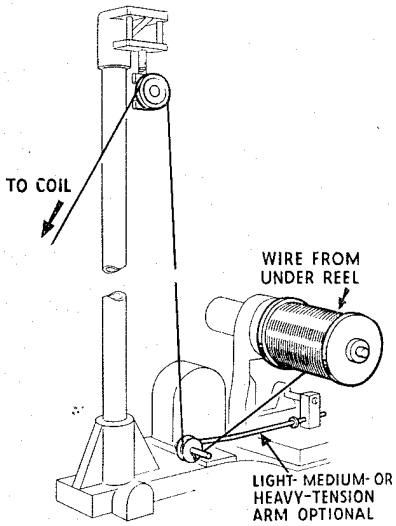
The " DOUGLAS " Universal Reel Carrier as illustrated on Plate No. 2 is especially useful when irregular-shape coils have to be wound. Wires from 50 s.w.g. (0·001"—0·025 mm.) to 21 s.w.g. (0·032" — 0·8 mm.) can be de-reeled, but it must be borne in mind that the maximum diameter of Reel which can be used is 4" (101 mm.). The reason for this limited diameter of reel is that if Reels having too large a gross weight are employed, the tension will vary considerably during the use of the wire on the Reel.

The Reel Carrier is complete with three Wire Guide Arms, namely, Light Tension Arm Assembly, Item 56, Medium Tension Arm Assembly, Item 55 and Heavy Tension Arm Assembly, Item 53. The light arm should be used for wires from 50 s.w.g. (0·001"—0·25 mm.) to 48 s.w.g. (0·0016"—0·04 mm.); the Medium arm for wires fro 47 s.w.g. (0·002"—0·05 mm.) to 33 s.w.g. (0·010"—0·25 mm.) and Heavy arm for wires from 32 s.w.g. (0·0108"—0·27 mm.) to 21 s.w.g. (0·032"—0·81 mm.). When the Heavy Tension Arm is being used the Spring, Item 60, is adjusted between the Arm and the Spindle, Item 59.

The Reset Spring, Item 38, contained inside the Cover, Item 58, is adjustable by means of the Hand Wheel Assembly, Item 27, and is set in accordance with the chart shown on Page 11. It must be borne in mind that the figures given on this chart are not intended to be taken as exact and are only an indication of the approximate position to which the indicator should be set. Variations will, of course, occur, due to the differences in tensile strengths of wire and weights of reels employed. The figures must, of course, be increased where wires other than copper are being wound.

The Slider Pulley, Item 8, mounted on the Guide Wires, Item 70, is attached to the Column Spring, Item 27, and is intended to act both as an over-run device and a shock absorber. The two Slider Stops, Item 68, should be set to allow the Slider to move between them within reasonable limits. For instance, if a round coil is being wound the distance between the Stops should be quite small, whilst if a coil of irregular section is being wound, with a large ratio difference between the length of the sides, the Stops should be set far apart. It is an advantage to use the Slider Pulley as near to the top of the column as possible.

The method of threading the wire over the Pulley on the Wire Guide Arm and the Slider Pulley is shown in the sketch below.




## POSITIONING THE REEL CARRIER

When setting the Reel Carrier up on the bench it should be borne in mind that the column end of the casting should be close to the Machine.

## MAINTAINING THE REEL CARRIER

Care should be taken to see that the Brake Pad which comes into contact with the Drum on the main Reel-Carrying Spindle is kept free from dirt, dust and oil. If dirt and dust are allowed to collect on this pad erratic tension will be obtained and rapid wear of the Drum will take place. The vertical wires should be kept lubricated with a fine grade oil and the Small Pulleys on the arms should also have their Spindles oiled at frequent intervals.

The Slider Pulley, Item 8, must be examined from time to time to ensure that it has not suffered damage, as this will affect the covering on the wire. This also applies to the Pulleys on the Light, Medium and Heavy Tension Arms.

# "DOUGLAS"
# GENERAL PURPOSE REEL CARRIER

The " DOUGLAS " General Purpose Reel Carrier, illustrated on Plate No. 3, is similar to that fitted to the " DOUGLAS " Large Multiple-Coil Winding Machine, and can be supplied either as a right or left hand Reel Carrier, i.e. with the Supply-Reel Spindle on the left or right hand side of the stand tube.

The design of this Reel Carrier has been greatly improved since the early prototype and now has four methods of applying tension, hence wires from 47 s.w.g. (0·002″ — 0·05 mm.) to 18 s.w.g. (0·048″ — 1·22 mm.) can be de-reeled when coils of round, square or rectangular section have to be wound. Care, however, should be taken to see that the Supply Reel is in accordance with the British Standards Institution Specification No. 1489, Table 3, included on Page 8, since Reels having an excessive gross weight cannot be adequately controlled.

The Reel Carriers can be purchased as a complete assembly on a tube similar to that for the " DOUGLAS " Standard Reel Carrier (shown on Plate No. 1).

## POSITIONING THE REEL CARRIER ON THE BENCH

The " DOUGLAS " General Purpose Reel Carrier assembly should be secured to the bench at the back of the Machine so that the angle " x " shown on sketch, Page 4, is approximately between 60°—80°, and the Pulley, Item 10, in the centre of the total traverse width. The Reel Carrier may be positioned on the tube by loosening the Cotter Pin, Item 39, and should be arranged as near to the top as possible, as this gives the best winding results.

## ADJUSTING THE TENSION

The Wire Supply Reel is first loaded on the Spindle with wire coming from the top of the Reel when unwound ; this is to ensure that the Quick Release Nut, Item 41, does not become loose during winding. From the Supply Reel the wire is drawn under the Pulley on the Spindle, Item 40, and over the top of the Pulley on the Arm, Item 5.

Under normal winding conditions it is only necessary to change the Light and Heavy Extension Springs, Item 19 and 20, according to the gauge of wire being de-reeled. A Tension Chart and Tension Brake Table are shown on Pages 9 & 10, the latter being only to serve as a guide. Therefore, if the following example is noted the various tension adjustments will be readily understood.

Assuming 46 s.w.g. (0·0024″ — 0·06 mm.) is to be de-reeled the Hand Wheel, Item 62, is turned until the Spring Barrel and Arm Assembly, Items 22 and 23, leave the Brake Lever, Item 48, i.e. with the Wire Tension Indicator, Item 69 or 70 turned past zero. The Light Tension Spring, Item 19, is assembled on the Arm and if used in conjunction with the Spring, Item 34, the required tension can be applied.

To adjust the tension a " Tensometer," if available, is used, between the wire from the Pulley, Item 10, and the Wire Guide Arms on the Paper Inserter Unit. The Machine is then run at top speed and the tension adjusted by loosening or tightening the Knurled Nuts, Items 17 and 35, until the Tensometer reads 1·5 ozs. (42 grams). If a Tensometer is not available a weight equal to 1·5 ozs. (42 grams) is hung on the wire from the Arm and the tension adjusted as described above until the Supply Reel commences to revolve.

It will now be seen that the Tension Brake Table can be used as a guide for various gauges of wire and the Tension Chart for the winding weights.

The Fixed Tension Adjuster may be used in either of two positions, one in the middle of the Brake Spring and the other directly over the Brake Block, this Adjuster is for use when sufficient tension cannot be applied by the other methods, and if the screw is placed in the middle hole the tension will not be as fierce as if placed directly over the Brake Block.

## MAINTAINING THE REEL CARRIER

The Pulley Wheels, Items 10 and 12, should be lubricated with a light grade oil every two to three days, and must be examined from time to time to ensure that they have not suffered damage, as this will affect the covering on the wire.

The Supply Reel Spindle, Item 41, must at all times rotate very freely, thus the Bearing, Item 47, must be lubricated with a light grade oil and dismantled from time to time and cleaned.

The Worm Wheel Bearings, Item 65, and the Worm and Worm Wheel Teeth, Items 65, 66 and 70, must also be lubricated.

On no account must oil or dirt be allowed to collect on the Friction Brake Pulley, Item 55, as this will seriously affect the winding tension.

# "DOUGLAS"
# FLYER REEL CARRIER

The "DOUGLAS" Flyer Reel Carrier is a take-off stand for use with heavy gauge wire and is illustrated on Plate No. 4. This Reel Carrier has been especially designed for winding coils such as L.T. secondaries, magneto coil primaries, or field or stator coils and can be used with any type of Winding Machine. Wires from 30 s.w.g. (0·0124″ — 0·3 mm.) to 14 s.w.g. (0·08″ — 0·3 mm.) can be de-reeled.

The Supply Drum sizes must be within the following dimensions :—

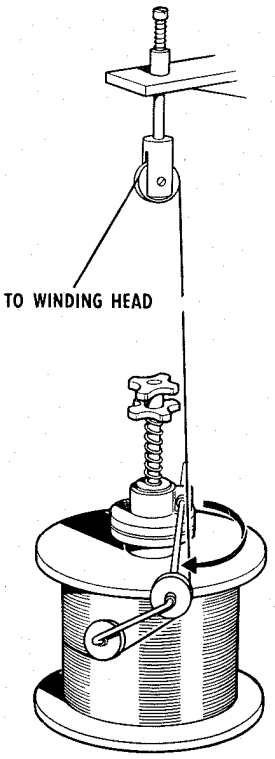
| | | |
|---|---|---|
| Maximum width of Drum | ... | 7″ (178 mm.) |
| Maximum diameter of Drum | ... | 13″ (330 mm.) |
| Maximum bore of Drum | ... | ¾″ (19 mm.) |

## POSITIONING THE REEL CARRIER

It is intended that the Flyer Drum Reel Carrier be secured to the floor behind the Machine within the centre of the total traverse width, but if the winding head of the Machine is fairly high the Carrier must be raised accordingly.

## ADJUSTING THE REEL CARRIER

To load the Wire Supply Drum, the Friction Disc Carrier Casting, Item 20, is unscrewed from the Stud, Item 26, this will allow the whole of the Tension Unit and Wire Guide Arm Assembly to be lifted away and the Supply Drum can then be placed over the Stud, care being taken to ensure that the wire rotates in a clockwise direction when de-reeled looking on the top of the Drum. This is important as it has the tendency to tighten the Friction Disc Carrier Casting on the Supply Drum, whereas if placed the other way round this Casting might become loose and lead to serious consequences. The Distance Pieces, Items 21 to 23, must, of course, be added or removed from the Stud to suit the width of the Drum being used, and the Loose Cone, Item 25, replaced on the Stud before loading the Supply Drum.




The Friction Disc Carrier Casting, etc., may now be replaced on the Stud and locked against the Supply Drum with a spanner. The next step is to adjust the Winding Arm, Item 8. To do this the Screw, Item 27, is loosened and the wire passed around the Pulleys, Item 3, the angle of the Lower Pulley and the distance of the Pulleys away from the rim of the Drum, will depend upon the size of the Drum being used —see accompanying sketch. *Note:* the wrap of the wire around the Pulleys should be sufficient to allow the wire to remain threaded when the winding is stopped suddenly. The remaining operation is to adjust the Top Friction Disc, Item 15, to give the desired tension according to the wire being de-reeled. To do this the Lower Hand Nut, Item 9, is screwed in a clockwise or anti-clockwise direction and when set is locked by the Upper Hand Nut.

## MAINTAINING THE REEL CARRIER

The Ball and Thrust Races, Items 14 and 18, in the Friction Head must be kept lubricated.

The Ball Races in the Winding Arm Pulleys, Item 3 and Pulley, Item 28, must be kept lubricated and from time to time removed and cleaned ; this is important as any tendency for these Pulleys to become solid with the Spindle may affect the covering on the wire

# "DOUGLAS"
# LINEAR MEASURE REEL CARRIER

The "DOUGLAS" Linear Measure Reel Carrier has been specially developed to record in yards, feet or metres the amount of material being de-reeled. This Reel Carrier is illustrated on Plate No. 5, which shows the Pre-Set Measure Indicator, etc., and yards or feet and/or yards or metres may be recorded according to the Wire Guide Pulley fitted, see Items Nos. 21 and 22.

The feature of this Reel Carrier is its usefulness when resistance wire is being wound. In addition, there are many uses for such a Reel Carrier in the Textile Industry, but since this Carrier is of recent development and its features in this connection are not fully known, only the de-reeling of wire is dealt with here.

Wires from 47 s.w.g. (0·002 ins.—0·05 mm.) diameter to 28 s.w.g. (0·0148 ins.—0·38 mm.) diameter can be de-reeled and the wire supply reel should be in accordance with British Standards Institute Specification No. 1489, Table 2 (an extract is reproduced on this page). The reason for this is that reels having an excessive gross weight cannot be adequately controlled.

Generally the function of this Reel Carrier is similar to the "DOUGLAS" Standard Reel Carrier, and for the instructions for setting the tension, etc., see Page 9. The only item that needs explaining here is the Measure Indicator.

## THE PRE-SET MEASURE INDICATOR

The Pre-Set Measure Indicator fitted to the "DOUGLAS" Linear Measure Reel Carrier is complete with electrical contacts, Items Nos. 43 and 44, and provision is made via the flexible coupling tube, Item No. 30, to connect the Reel Carrier electrically to the clutch or similar operating mechanism of the Coil Winding Machine. Care should be taken not to make connection to the motor circuit as this would allow overrun of the Machine and an erroneous length of wire would result.

The setting of the Measure Indicator is made by positioning the Barrel Indicator, Item No. 11, and the Pointer, Item No. 33.

*For example:*—Assuming 1,650 yards of wire are required to be de-reeled. The wire is first drawn from the Supply Reel and passed over the large Wire Guide Pulley, Item 21 or Item 22 as fitted, and down to the former. The Barrel Indicator is then turned until 1,600 shows in the aperture of the Indicator Cowl, Item 11 and the Pointer is set at 50 on the Calibrated Dial, Item 35; this automatically opens the electrical contacts. Winding may now be commenced and when the predetermined length is reached, the contacts close.

Up to 2,000 yards, feet or metres can be recorded.

## WIRE SUPPLY REEL SIZES

| DIAMETER OF WIRE | | | REEL FLANGE DIAMETER | | DIAMETER OF WIRE | | | REEL FLANGE DIAMETER | |
|---|---|---|---|---|---|---|---|---|---|
| INCHES | METRIC mm. | S.W.G. | INS. | METRIC mm. | INCHES | METRIC mm. | S.W.G. | INS. | METRIC mm. |
| 0·001 | 0·025 | 50 | 1¾″ | 44·45 | 0·010 | 0·254 | 33 | 3¾″ | 95·25 |
| 0·0012 | 0·03 | 49 | 1¾″ | 44·45 | 0·0108 | 0·256 | 32 | 3¾″ | 95·25 |
| 0·0016 | 0·04 | 48 | 1¾″ | 44·45 | 0·0116 | 0·280 | 31 | 3¾″ | 95·25 |
| 0·0020 | 0·05 | 47 | 2⅛″ | 53·97 | 0·0124 | 0·306 | 30 | 4½″ | 114·3 |
| 0·0024 | 0·06 | 46 | 2⅛″ | 53·97 | 0·0136 | 0·331 | 29 | 4½″ | 114·3 |
| 0·0028 | 0·07 | 45 | 2½″ | 63·5 | 0·0148 | 0·358 | 28 | 4½″ | 114·3 |
| 0·0032 | 0·081 | 44 | 2½″ | 63·5 | 0·0164 | 0·407 | 27 | 4½″ | 114·3 |
| 0·0036 | 0·098 | 43 | 2½″ | 63·5 | 0·0180 | 0·457 | 26 | 4½″ | 114·3 |
| 0·0040 | 0·102 | 42 | 2½″ | 63·5 | 0·020 | 0·508 | 25 | 4½″ | 114·3 |
| 0·0044 | 0·114 | 41 | 3″ | 76·2 | 0·022 | 0·559 | 24 | 4½″ | 114·3 |
| 0·0048 | 0·122 | 40 | 3″ | 76·2 | 0·024 | 0·610 | 23 | 4½″ | 114·3 |
| 0·0052 | 0·132 | 39 | 3″ | 76·2 | 0·028 | 0·711 | 22 | 6″ | 152·4 |
| 0·0060 | 0·152 | 38 | 3¾″ | 95·25 | 0·032 | 0·813 | 21 | 6″ | 152·4 |
| 0·0068 | 0·172 | 37 | 3¾″ | 95·25 | 0·036 | 0·914 | 20 | 6″ | 152·4 |
| 0·0076 | 0·194 | 36 | 3¾″ | 95·25 | 0·040 | 1·016 | 19 | 6″ | 152·4 |
| 0·0084 | 0·213 | 35 | 3¾″ | 95·25 | 0·048 | 1·219 | 18 | 6″ | 152·4 |
| 0·0092 | 0·234 | 34 | 3¾″ | 95·25 | | | | | |

Part of the above Table is reproduced by permission of THE BRITISH STANDARDS INSTITUTION, B.S. Specification 1489 (Table 2).

# "DOUGLAS" GENERAL PURPOSE REEL CARRIER

## TENSION CHART—*Inches*

| *Light Spring* | | | *Heavy Spring* | | |
|---|---|---|---|---|---|
| GAUGE | WINDING WEIGHT | INDEX | GAUGE | WINDING WEIGHT | INDEX |
| 47 s.w.g. | 1 oz. | 4 | 36 s.w.g. | 9 ozs. | 50 |
| 46 ,, | 1½ ozs. | 6 | 35 ,, | 10 ,, | 60 |
| 45 ,, | 2 ,, | 17 | 34 ,, | 11½ ,, | 70 |
| 44 ,, | 2½ ,, | 25 | 33 ,, | 13 ,, | 80 |
| 43 ,, | 3 ,, | 35 | 32 ,, | 14 ,, | 90 |
| 42 ,, | 3½ ,, | 45 | 31 ,, | 15 ,, | 100 |
| 41 ,, | 4 ,, | 55 | 30 ,, | 16 ,, | 110 |
| 40 ,, | 5 ,, | 75 | 29 ,, | 18 ,, | 120 |
| 39 ,, | 5½ ,, | 85 | | | |
| 38 ,, | 6½ ,, | 100 | | | |
| 37 ,, | 8 ,, | 120 | | | |

## TENSION CHART—*Metric*

| *Light Spring* | | | *Heavy Spring* | | |
|---|---|---|---|---|---|
| GAUGE | WINDING WEIGHT | INDEX | GAUGE | WINDING WEIGHT | INDEX |
| 0·05 | 28 grams | 4 | 0·19 | 255 grams | 50 |
| 0·06 | 42 ,, | 6 | 0·21 | 283 ,, | 60 |
| 0·07 | 56 ,, | 17 | 0·23 | 326 ,, | 70 |
| 0·08 | 70 ,, | 25 | 0·25 | 369 ,, | 80 |
| 0·09 | 85 ,, | 35 | 0·27 | 397 ,, | 90 |
| 0·10 | 100 ,, | 45 | 0·29 | 425 ,, | 100 |
| 0·11 | 113 ,, | 55 | 0·32 | 454 ,, | 110 |
| 0·12 | 142 ,, | 75 | 0·35 | 510 ,, | 120 |
| 0·13 | 156 ,, | 85 | | | |
| 0·15 | 184 ,, | 100 | | | |
| 0·17 | 227 ,, | 120 | | | |

NOTE.—The winding weights shown in the tables are those specified by certain wire manufacturers and may have to be exceeded to obtain tight wound coils. The Index figures refer to those marked on the Reel Carrier Dials and should be used only as a guide, that is the Reel Carrier is set to the figures in the tables and finally adjusted as described in the text.

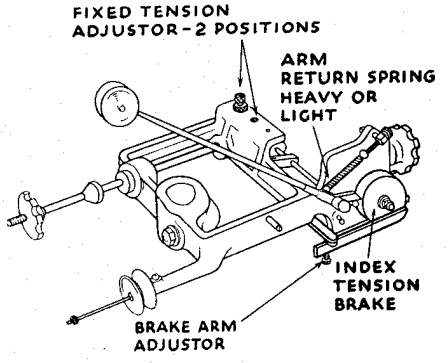
# "DOUGLAS" GENERAL PURPOSE REEL CARRIER

## TENSION BRAKE TABLE

| SHAPE OF COIL FORMER | GAUGE OF WIRE | ARM RETURN SPRING | BRAKE ARM SPRING | INDEX TENSION BRAKE | FIXED TENSION |
|---|---|---|---|---|---|
| ROUND | 47–37 (0·05)–(0·17) | LIGHT | OFF | SEE CHART | OFF |
| SQUARE OR RECTANGULAR | 47–44 (0·05)–(0·08) | LIGHT | APPLIED TO SUIT | OFF | OFF |
| SQUARE OR RECTANGULAR | 43–40 (0·09)–(0·12) | HEAVY | APPLIED TO SUIT | OFF | OFF |
| SQUARE OR RECTANGULAR | 41–37 (0·11)–(0·17) | HEAVY | APPLIED TO SUIT | APPLIED TO SUIT LESS THAN CHART | OFF |
| ROUND | 36–29 (0·19)–(0·35) | HEAVY | OFF | SEE CHART | OFF |
| SQUARE OR RECTANGULAR | 36–29 (0·19)–(0·35) | HEAVY | APPLIED TO SUIT | APPLIED TO SUIT LESS THAN CHART | OFF |
| ROUND, SQUARE OR RECTANGULAR | 28–26 (0·37)–(0·45) | HEAVY | OFF | APPLIED TO SUIT | APPLIED TO SUIT IN EITHER POSITION |

NOTE.—The above table shows how the various tension adjustments may be used on the reel carrier. No hard and fast rules can be laid down as conditions vary with different makes of wire and coverings and the manner of spooling on the supply reels.

**BRAKE SITUATIONS**



# UNIVERSAL REEL CARRIER—TENSION CHART

| GAUGE OF WIRE | WINDING WEIGHT | DIAL INDEX | TYPE OF ARM | GAUGE OF WIRE | WINDING WEIGHT | DIAL INDEX | ARM INDEX | TYPE OF ARM |
|---|---|---|---|---|---|---|---|---|
| 50 (0·025) | | 2 | *Light Tension Arm* | 32 (0·274) | 14 ozs. | 60 | 1 | |
| 49 (0·03) | | 2.5 | | 31 (0·294) | 15 ,, | 60 | 2 | |
| 48 (0·04) | | 4 | | 30 (0·315) | 16 ,, | 60 | 3 | |
| 47 (0·05) | 1 oz. | 4 | *Medium Tension Arm* | 29 (0·345) | 18 ,, | 60 | 4 | |
| 46 (0·061) | 1½ ozs. | 6 | | 28 (0·375) | 20 ,, | 60 | 5 | |
| 45 (0·071) | 2 ,, | 8 | | 27 (0·416) | 23 ,, | 60 | 6 | *Heavy Tension Arm* |
| 44 (0·081) | 2½ ,, | 10 | | 26 (0·457) | 25 ,, | 60 | 7 | |
| 43 (0·091) | 3 ,, | 13 | | 25 (0·508) | 28 ,, | 60 | 8 | |
| 42 (0·101) | 3½ ,, | 18 | | 24 (0·558) | 31 ,, | 60 | 9 | |
| 41 (0·111) | 4 ,, | 25 | | 23 (0·609) | 35 ,, | 60 | 10 | |
| 40 (0·121) | 5 ,, | 35 | | 22 (0·711) | 39 ,, | 60 | 11 | |
| 39 (0·132) | 5½ ,, | 42 | | 21 (0·812) | 44 ,, | 60 | 12 | |
| 38 (0·152) | 6½ ,, | 60 | | | | | | |
| 37 (0·172) | 8 ,, | 75 | | | | | | |
| 36 (0·193) | 9 ,, | 85 | | | | | | |
| 35 (0·213) | 10 ,, | 95 | | | | | | |
| 34 (0·233) | 11½ ,, | 110 | | | | | | |
| 33 (0·254) | 13 ,, | 120 | | | | | | |

Dimensions between ( ) are millimetres.

NOTE.—The Arm Index refers to the setting of the spring, Item 60, on the spindle, Item 59, see Plate 3.

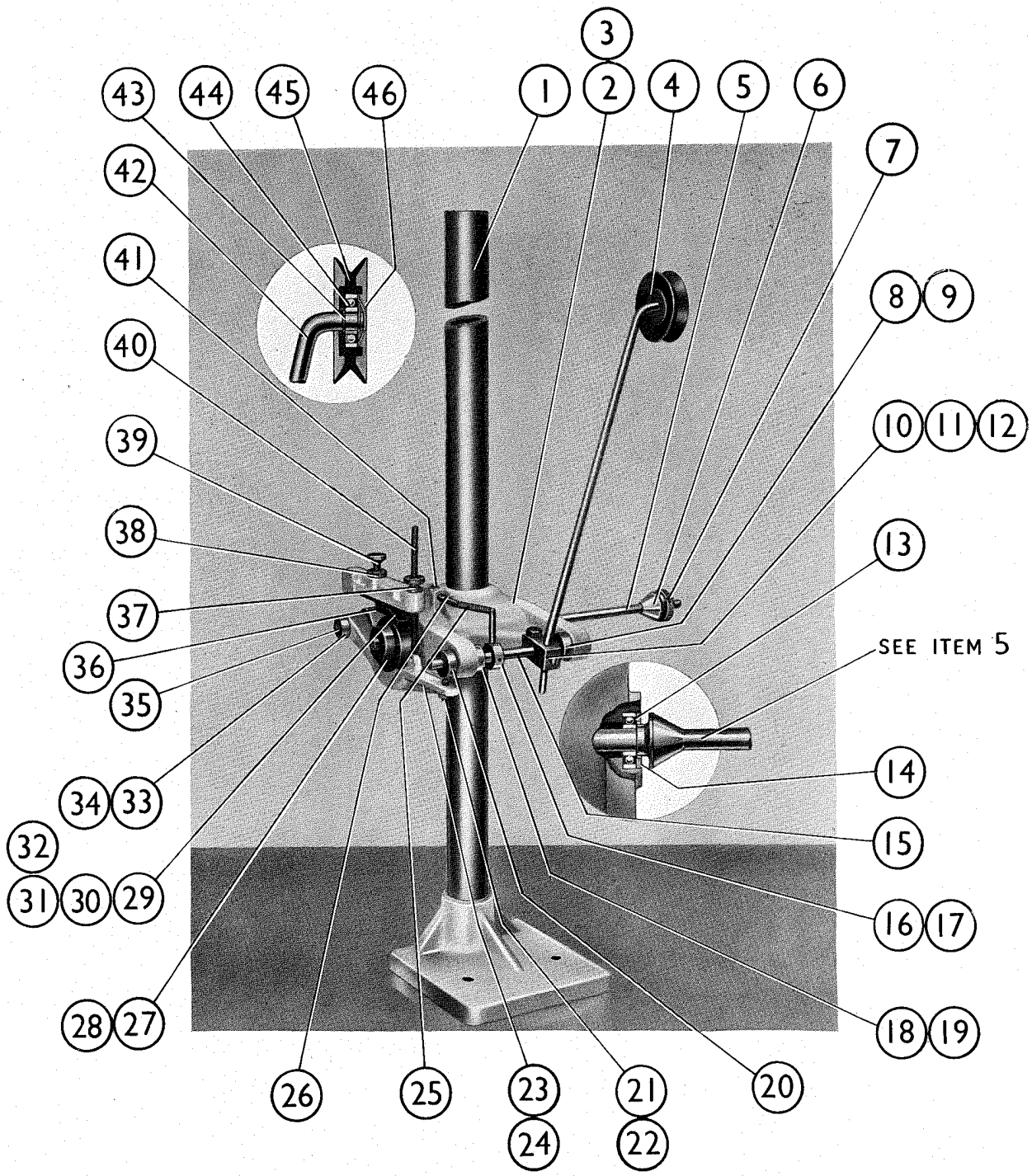
The winding weights shown in the Table are those specified by certain wire manufacturers and may have to be adjusted accordingly.

# Plate 1—Parts List

| ITEM NO. | DESCRIPTION | PART NO. | NO. OFF |
|---|---|---|---|
| 1 | Base and Tube Assembly | 20283/A | 1 |
| 2 | Complete Reel Carrier Assembly | 50032/A | |
| 3 | Main Casting Assembly including Pt 40146-2, 20273-2 & 2OFF AS46 | 20279/A | 1 |
| 4 | Pulley and Arm Assembly including Ball Race, etc. | 13967/A | 1 |
| 5 | Main Spindle and Cone Assembly | 20278/A | 1 |
| 6 | Loose Cone | 11745/1 | 1 |
| 7 | Quick Release Nut | 11746/2 | 1 |
| 8 | Stop Collar | 11760/2 | 1 |
| 9 | Grub Screw Securing Item 8 | AS.23 | 1 |
| 10 | Clamping Block for Pulley Arm | 11763/2 | 1 |
| 11 | Set Screw for locking Clamping Block | S.117 | 1 |
| 12 | Screw Securing Pulley Arm | S.413 | 1 |
| 13 | Ball Races for Main Spindle | BR.5 | 2 |
| 14 | Dust Covers for Ball Races | 11776/2 | 2 |
| 15 | Cam Spindle | 11764/2 | 1 |
| 16 | Collar and Spring Post Assembly | 11765/A | 1 |
| 17 | Grub Screw Securing Item 16 | AS.23 | 1 |
| 18 | Collar | 11768/2 | 1 |
| 19 | Grub Screw Securing Item 18 | AS.23 | 1 |
| 20 | Cam | 11758/2 | 1 |
| 21 | Cam Adjusting Screw | S.234 | 1 |
| 22 | Lock Nut for Cam Adjusting Screw | N.22 | 1 |
| 23 | Bottom Brake Shoe Assembly including Leather | 20277/A | 1 |
| 24 | Leather for Bottom Brake Shoe | 11749/1 | 1 |
| 25 | Return Spring for Pulley Arm | 11756/1 | 1 |
| 26 | Adjusting Stud for Item 25 | 11755/1 | 1 |
| 27 | Brake Drum | 11743/1 | 1 |
| 28 | Grub Screw Securing Item 27 | AS.28 | 1 |
| 29 | Upper Brake Spring and Leather Assembly | 11766/A | 1 |
| 30 | Backing Strip | 11752/1 | 1 |
| 31 | Screw Securing Items 29 and 30 | S.221 | 1 |
| 32 | Washer | W.1 | 1 |
| 33 | Collar Securing Item 23 | 11748/2 | 1 |
| 34 | Grub Screw Securing Item 33 | AS.23 | 1 |
| 35 | Spindle for Lower Brake Shoe | 11747/1 | 1 |
| 36 | Leather for Upper Brake Shoe | 11750/1 | 1 |
| 37 | Adjusting Nut for Lower Brake Shoe Spring | 11557/2 | 1 |
| 38 | Knurled Lock Nut | 11754/2 | 1 |
| 39 | Adjusting Screw for Upper Brake Shoe | 11753/2 | 1 |
| 40 | Spring for Lower Brake Shoe | 11757/1 | 1 |
| 41 | Knurled Nut for Item 25 | 11473/2 | 1 |
| 42 | Pulley Arm | 20276/1 | 1 |
| 43 | Circlip | 11777/1 | 2 |
| 44 | Ball Race for Pulley | BR.4 | 1 |
| 45 | Pulley | 20282/2 | 1 |
| 46 | Dust Cover for Ball Race | 11775/2 | 1 |

# "DOUGLAS" STANDARD REEL CARRIER

## PLATE 1.

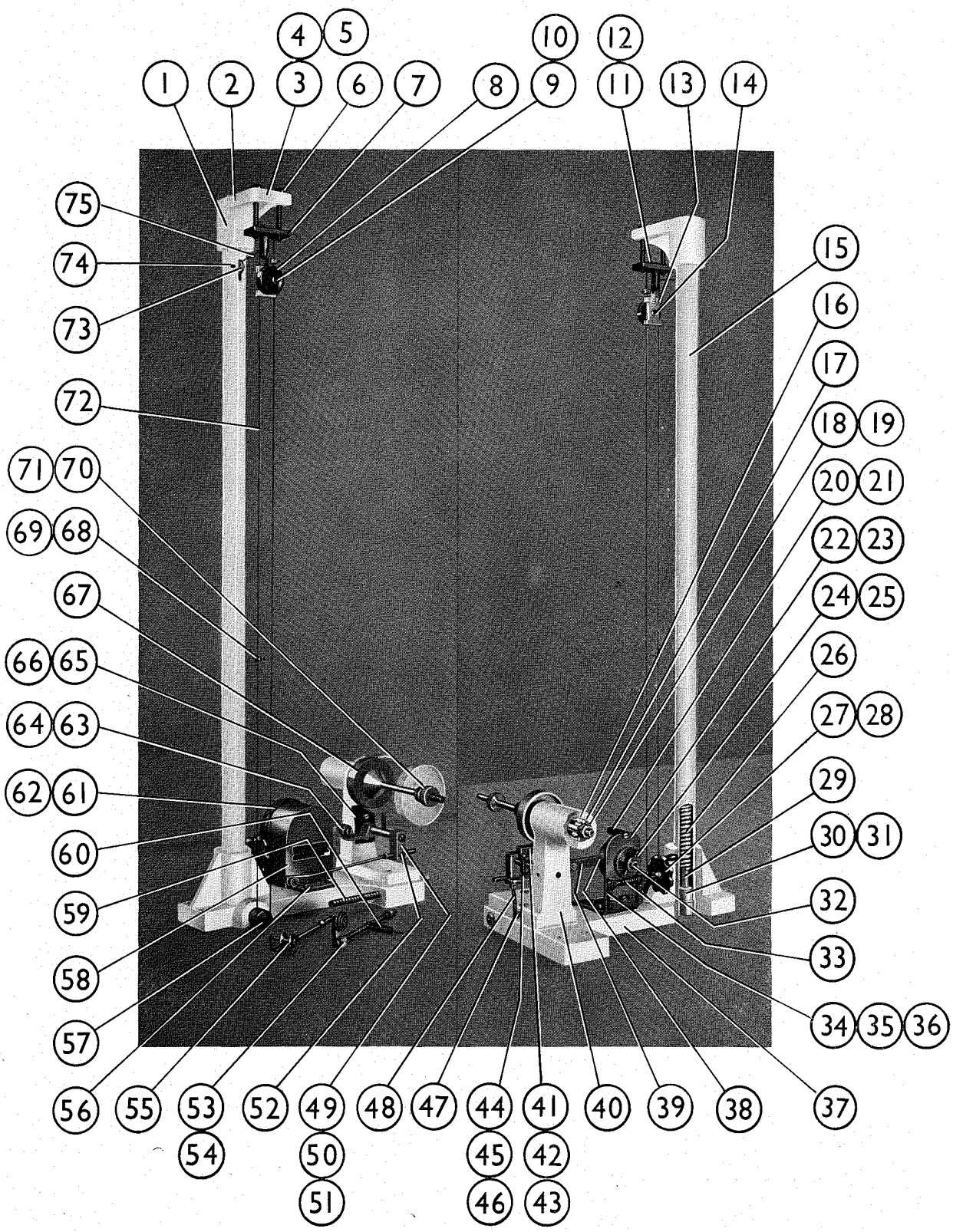


# Plate 2—Parts List

| ITEM NO. | DESCRIPTION | PART NO. | NO. OFF |
|---|---|---|---|
| 1 | Complete Reel Carrier Assembly | 50085/A | 1 |
| 2 | Base, Tube and Column Head Assembly, comprising Pt. No. 20527/2, 20751/2, 40246/2, 40245/2 S.11 and 20339/42 | 20748/A | 1 |
| 3 | Column Head | 20527/3 | 1 |
| 4 | Pin Securing Column Head | 20339/42 | 1 |
| 5 | Screw Positioning Column Head | AS.51 | 1 |
| 6 | Slider Tension Screws | BSF.3 | 2 |
| 7 | Tension Plate and Pulley Bracket Assembly | 13645/A | 1 |
| 8 | Slider Pulley and Bush | 13643/A | 1 |
| 9 | Collar for Slider Pulley | 13623/2 | 1 |
| 10 | Grub Screw for Collar Item 9 | S.811 | 1 |
| 11 | Screws Anchoring Slider Wires | AS.5 | 2 |
| 12 | Washers for Screws Item 11 | W.16 | 2 |
| 13 | Slider Assembly | 13644/A | 1 |
| 14 | Slider Pulley Spindle | 13622/2 | 1 |
| 15 | Column Tube | 20751/2 | 1 |
| 16 | Ball Race for Main Spindle | BR.5 | 2 |
| 17 | Dust Cover for Ball Race Item 16 | 13632/2 | 1 |
| 18 | Special Lock Nut for Main Spindle | 10621/1 | 1 |
| 19 | Standard Lock Nut | N.31 | 1 |
| 20 | Pillars for Cover | 13588/2 | 2 |
| 21 | Screws Securing Pillar Item 20 | S.47 | 2 |
| 22 | Bracket for Spring Tension Unit | 13586/2 | 1 |
| 23 | Screws Securing Bracket Item 22 | S.448 | 4 |
| 24 | Worm Wheel | 11410/1 | 1 |
| 25 | Pin Securing Worm Wheel Item 24 | R.27 | 1 |
| 26 | Column Spring | 13003/1 | 1 |
| 27 | Hand Wheel Assembly | 13608/A | 1 |
| 28 | Pin Securing Hand Wheel, Item 27 | R.27 | 1 |
| 29 | Anchor Rod for Column Spring, Item 26 | 13601/1 | 1 |
| 30 | Plug | 13628/1 | 1 |
| 31 | Screw Securing Item 30 | S.233 | 1 |
| 32 | Spring Barrel Arbor | 13593/2 | 1 |
| 33 | Worm | 11411/2 | 1 |
| 34 | Worm Carrier Bracket | 13594/2 | 2 |
| 35 | Screws Securing Item 34 | AS.5 | 2 |
| 36 | Dowels for Item 34 | 20245/20 | 4 |
| 37 | Base | 40245/2 | 1 |
| 38 | Reset Spring | 11403/1 | 1 |
| 39 | Spring Barrel and Arm Assembly | 13646/B | 1 |
| 40 | Headstock | 40246/2 | 1 |
| 41 | Brake Block and Pad Assembly | 14201/A | 1 |
| 42 | Brake Pad | 13630/1 | 1 |
| 43 | Screw Securing Item 41 | 13600/2 | 1 |
| 44 | Thrust Rod | 13626/2 | 1 |
| 45 | Roller for Thrust Rod | 13627/2 | 1 |
| 46 | Lock Nut for Item 44 | N.20 | 1 |
| 47 | Anchor Post for Spring Item 48 | 13597/2 | 1 |
| 48 | Spring | 11928/1 | 1 |
| 49 | Fulcrum Lever Assembly | 13640/A | 1 |
| 50 | Spindle for Fulcrum Lever Assembly, Item 49 | 13602/1 | 1 |
| 51 | Screw Securing Fulcrum Lever Assembly, Item 49 | 13603/2 | 1 |
| 52 | Screw Securing Wire Guide Arm | S.221 | 1 |
| 53 | Heavy Tension Arm Assembly | 20750/A | 1 |
| 54 | Ball Race for Item 53 | BR.3 | 1 |
| 55 | Medium Tension Arm Assembly | 13652/A | 1 |
| 56 | Light Tension Arm Assembly | 13642/A | 1 |
| 57 | Anchor for Slider Guide Wire | 13619/2 | 1 |
| 58 | Cover for Spring Tension Unit | 20749/A | 1 |
| 59 | Spindle for Heavy Tension Arm Spring | 13604/2 | 1 |
| 60 | Spring for Heavy Tension Arm | 11918/1 | 1 |
| 61 | Tension Index Drum | 13583/2 | 1 |
| 62 | Screw Securing Item 61 | 11409/2 | 1 |
| 63 | Roller for Item 39 | 13629/1 | 1 |
| 64 | Screw Securing Roller | 13592/2 | 1 |
| 65 | Brake Carrier Plate | 13598/2 | 1 |
| 66 | Screws Securing Item 65 | AS.5 | 2 |
| 67 | Spindle and Brake Drum Assembly | 20664/A | 1 |
| 68 | Slider Stops | 13620/2 | 2 |
| 69 | Screws Securing Slider Stops Item 68 | S.838 | 2 |
| 72 | Slider Guide Wire | SW.5 | 1 |
| 73 | Tension Cord Pulley | 13585/2 | 1 |
| 74 | Spindle for Item 71 | 13616/1 | 1 |
| 75 | Tension Cord | MISC.37 | 30 ins |

# "DOUGLAS" UNIVERSAL REEL CARRIER

## PLATE 2.



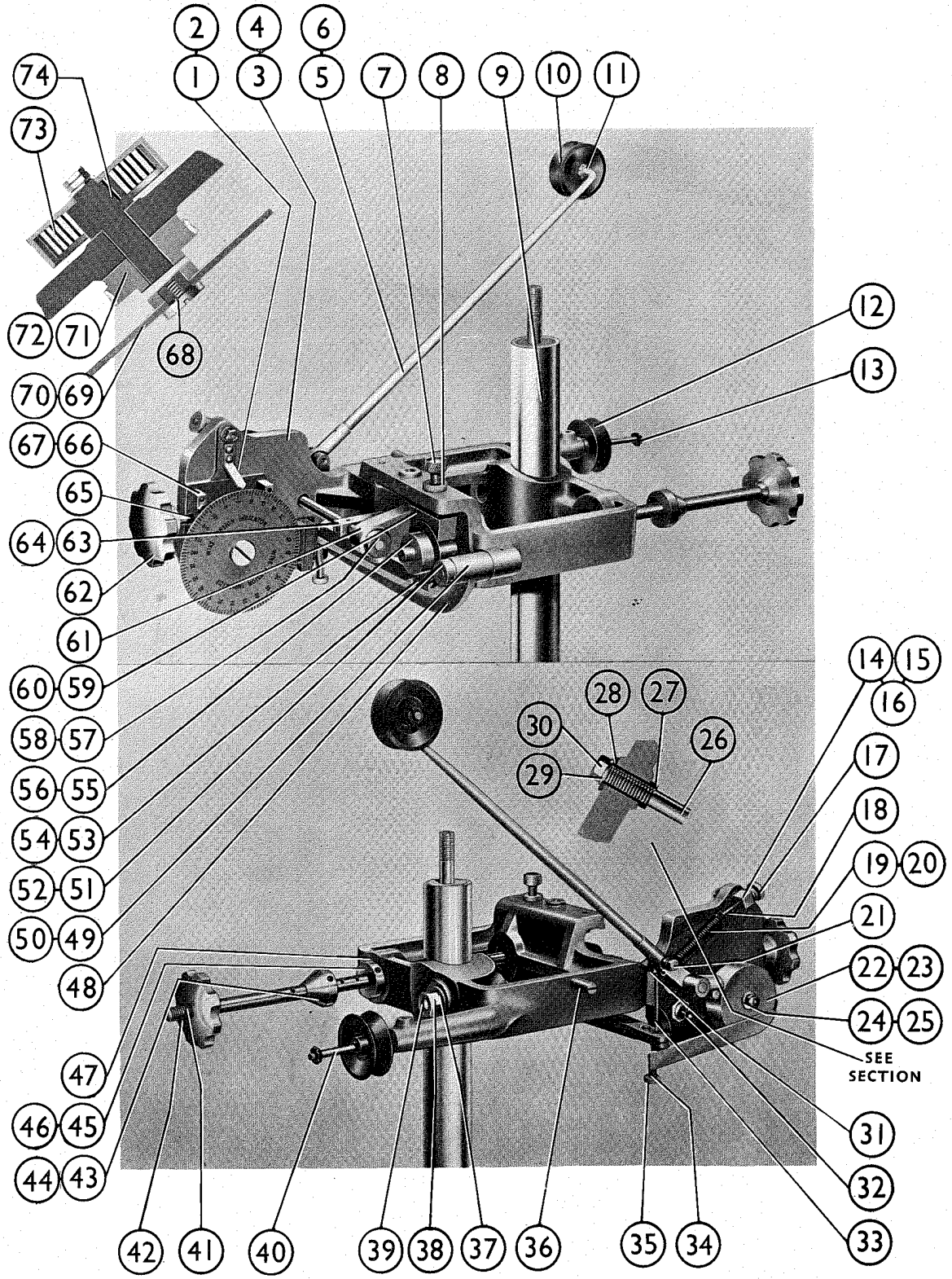
# Plate 3—Parts List

| ITEM NO. | DESCRIPTION | PART NO. | *A | *B |
|---|---|---|---|---|
| 1 | Indicator for Dial | 11406/2 | 1 | 1 |
| 2 | Screws Securing Indicator | S.636 | 2 | 2 |
| 3 | Frame for Reel Carrier R.H. | 50037/3 | 1 | – |
| 4 | Frame for Reel Carrier L.H. | 50037/4 | – | 1 |
| 5 | Pulley Arm and Shaft Assembly R.H. | 20336/D | 1 | – |
| 6 | Pulley Arm and Shaft Assembly L.H. | 20336/C | – | 1 |
| 7 | Adjusting Screw for Brake Block Assembly | 12225/2 | 1 | 1 |
| 8 | Locknut for Adjusting Screw | 11754/4 | 1 | 1 |
| 9 | Support Tube Assembly | 20335/A | 1 | 1 |
| 10 | Pulley Wheel for Pulley Arm Assembly | 10835/3 | 1 | 1 |
| 11 | Twicklip | 11579/3 | 2 | 2 |
| 12 | Pulley Wheel for Lower Pulley Spindle | 10835/3 | 1 | 1 |
| 13 | Twicklip for Item 12 | 11579/3 | 1 | 1 |
| 14 | Block for Adjusting Screw | 12229/2 | 1 | 1 |
| 15 | Washer | W.15 | 1 | 1 |
| 16 | Nut Securing Adjusting Block | N.40 | 2 | 2 |
| 17 | Knurled Nut for Adjusting Screw | 11557/2 | 1 | 1 |
| 18 | Adjusting Screw | 11755/2 | 1 | 1 |
| 19 | Light Extension Spring | 13438/1 | 1 | 1 |
| 20 | Heavy Extension Spring | 11421/1 | 1 | 1 |
| 21 | Anchor Post for Extension Spring | 11395/3 | 1 | 1 |
| 22 | Spring Barrel and Arm Assembly R.H. | 20271/B | 1 | – |
| 23 | Spring Barrel and Arm Assembly L.H. | 20271/D | – | 1 |
| 24 | Washer | W.15 | 1 | 1 |
| 25 | Nut Securing Spring Arbor | N.40 | 2 | 2 |
| 26 | Contact Stop Stud | 11460/2 | 1 | 1 |
| 27 | Insulating Bush | 11461/1 | 1 | 1 |
| 28 | Insulating Washer | 30008/13 | 1 | 1 |
| 29 | Washer | W.15 | 1 | 1 |
| 30 | Nut Securing Stud | N.41 | 1 | 1 |
| 31 | Swivel Block | 20708/2 | 1 | 1 |
| 32 | Switch, Single Pole, ON-OFF | 11549/1 | 1 | 1 |
| 33 | Release Rod for Friction Brake | 12707/2 | 1 | 1 |
| 34 | Spring | 12705/2 | 1 | 1 |
| 35 | Knurled Nut | 12706/2 | 1 | 1 |
| 36 | Stop Pin | 12233/2 | 1 | 1 |
| 37 | Washer | W.23 | 1 | 1 |
| 38 | Nut Securing Cotter Pin | N.30 | 1 | 1 |
| 39 | Cotter Pin | 11399/2 | 1 | 1 |
| 40 | Pulley Spindle | 11397/2 | 1 | 1 |
| 41 | Spindle for Supply Reel | 14029/1 | 1 | 1 |
| 42 | Hand Wheel | 14028/1 | 1 | 1 |
| 43 | Adjustable Cone | 11075/2 | 1 | 1 |
| 44 | Screw Securing Adjustable Cone | 13470/1 | 1 | 1 |
| 45 | Collar | 11078/2 | 1 | 1 |
| 46 | Screw Securing Collar | 13470/1 | 1 | 1 |
| 47 | Ball Race | BR.5 | 2 | 2 |
| 48 | Brake Lever, Complete | 20701/A | 1 | 1 |
| 49 | Spindle for Brake Lever | 11747/2 | 1 | 1 |
| 50 | Pin Securing Spindle | 20245/22 | 1 | 1 |
| 51 | Collar | 11748/2 | 1 | 1 |
| 52 | Screw Securing Collar | AS.23 | 1 | 1 |
| 53 | Brake Pad | 11384/1 | 1 | 1 |
| 54 | Screw Securing Brake Pad | S.806 | 2 | 2 |
| 55 | Friction Brake Pulley | 11743/1 | 1 | 1 |
| 56 | Screw Securing Friction Brake Pulley | 13470/1 | 1 | 1 |
| 57 | Collar | 11748/2 | 1 | 1 |
| 58 | Screw Securing Collar | AS.23 | 1 | 1 |
| 59 | Fixed Tension Brake | 12214/A | 1 | 1 |
| 60 | Screw Securing Item 59 | S.219 | 1 | 1 |
| 61 | Reservoil Bush | 11658/2 | 1 | 1 |
| 62 | Hand Wheel | 20325/1 | 1 | 1 |
| 63 | Brake Release Block | 13469/A | 1 | 1 |
| 64 | Pin Securing Brake Release Block | 20245/20 | 1 | 1 |
| 65 | Worm Spindle | 11411/2 | 1 | 1 |
| 66 | Worm Carrier Bracket | 11412/2 | 2 | 2 |
| 67 | Screw Securing Worm Carrier Bracket | S.469 | 2 | 2 |
| 68 | Special Screw, Fixing Dial | 11409/2 | 1 | 1 |
| 69 | Wire Tension Indicator Dial R.H. | 11552/3 | 1 | – |
| 70 | Wire Tension Indicator Dial L.H. | 11552/4 | – | 1 |
| 71 | Worm Wheel | 11410/1 | 1 | 1 |
| 72 | Pin Securing Worm Wheel | R.27 | 1 | 1 |
| 73 | Clock Spring | 11403/1 | 1 | 1 |
| 74 | Spring Arbor | 11407/1 | 1 | 1 |

*A: RIGHT HAND. *B: LEFT HAND.

# "DOUGLAS" GENERAL PURPOSE REEL CARRIER

## PLATE 3.

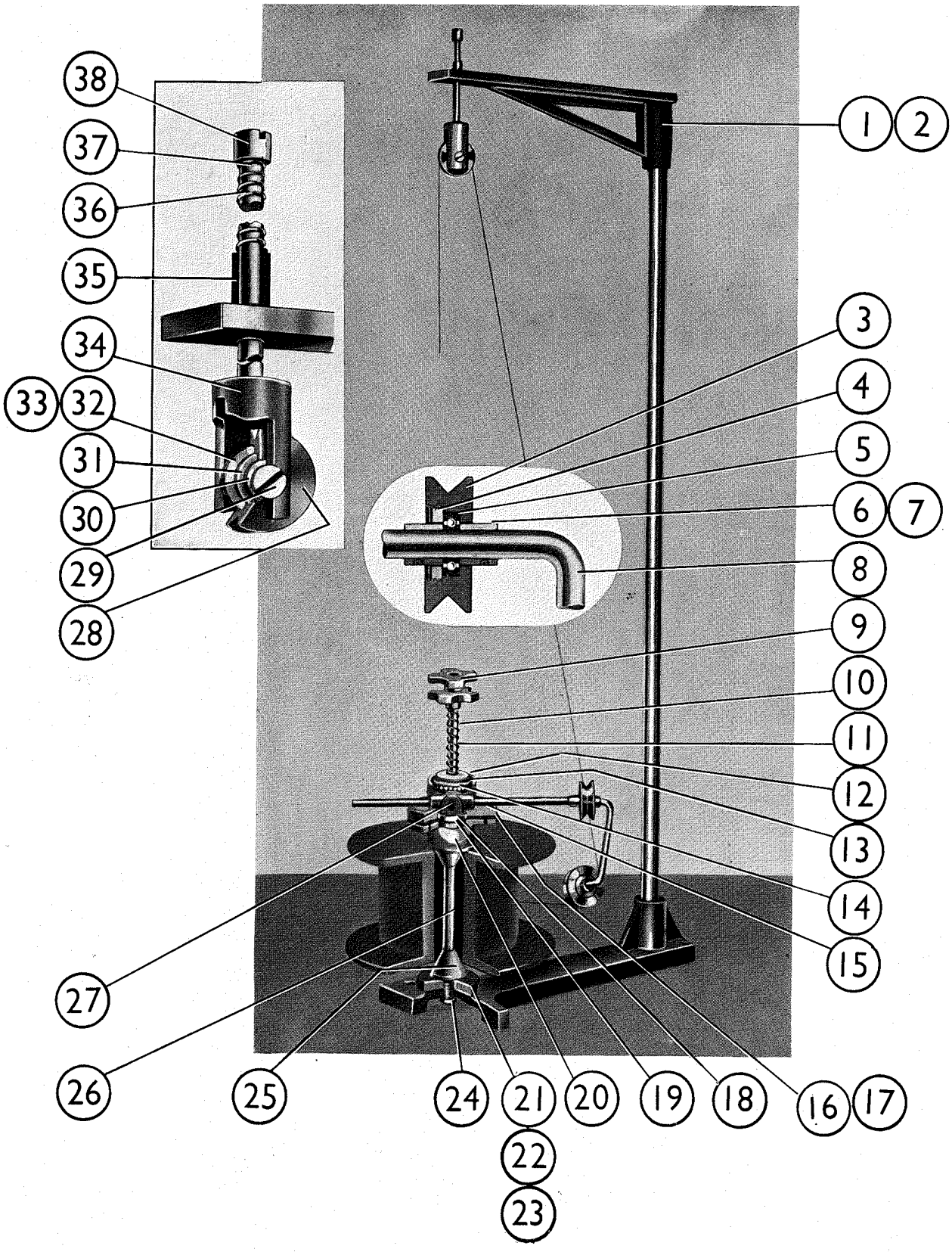


# Plate 4—Parts List

| ITEM NO. | DESCRIPTION | PART NO. | NO. OFF |
|---|---|---|---|
| 1 | Complete Reel Carrier Assembly | 50004/A | |
| 2 | Base, Column and Head Assembly comprising Pt. No. 40006/2, 10148/1, 40007/2, and 3 off 20339/33 | 40416/A | 1 |
| 3 | Winding Arm Pulleys | 10706/2 | 2 |
| 4 | Ball Race Retaining Discs | 10151/2 | 2 |
| 5 | Ball Races | BR.5 | 2 |
| 6 | Winding Arm Collars | 10239/2 | 4 |
| 7 | Screws Securing Winding Arm Collars, Item 6 | S.499 | 4 |
| 8 | Winding Arm | 20016/1 | 1 |
| 9 | Hand Nuts | 10143/2 | 2 |
| 10 | Tension Spring | 10144/1 | 1 |
| 11 | Studs | 10142/1 | 1 |
| 12 | Thrust Washer | 10145/2 | 1 |
| 13 | Thrust Race Cover | 10146/1 | 1 |
| 14 | Thrust Race | BR.15 | 1 |
| 15 | Top Friction Disc | 20013/2 | 1 |
| 16 | Friction Disc | 20014/1 | 1 |
| 17 | Screws Securing Friction Disc, Item 16 | S.440 | 4 |
| 18 | Ball Race | BR.1 | 2 |
| 19 | Dust Cover for Item 18 | 12339/6 | 1 |
| 20 | Friction Disc Carrier Casting | 20015/2 | 1 |
| 21 | Distance Piece $\frac{1}{4}$″ thick | 10154/1 | 1 |
| 22 | Distance Piece $\frac{1}{2}$″ thick | 10154/2 | 1 |
| 23 | Distance Piece 1″ thick | 10154/3 | 1 |
| 24 | Lock Nuts | N.32 | 2 |
| 25 | Loose Cone | 10153/1 | 1 |
| 26 | Stud | 10142/2 | 1 |
| 27 | Screw Securing Winding Arm, Item 8 | B.S.F.2 | 1 |
| 28 | Pulley | 10150/2 | 1 |
| 29 | Special Screw | 10152/2 | 1 |
| 30 | Washer | 10238/2 | 1 |
| 31 | Ball Race | BR.5 | 1 |
| 32 | Ball Race Retaining Ring | 10151/1 | 1 |
| 33 | Spacing Washer for Ball Race, Item 31 | 10238/1 | 1 |
| 34 | Bearing Bracket | 10141/2 | 1 |
| 35 | Bush | 10707/2 | 1 |
| 36 | Top Spring | 10709/1 | 1 |
| 37 | Top Stud | 10708/2 | 1 |
| 38 | Retaining Cap | 10710/2 | 1 |

# "DOUGLAS" FLYER REEL CARRIER

## PLATE 4.



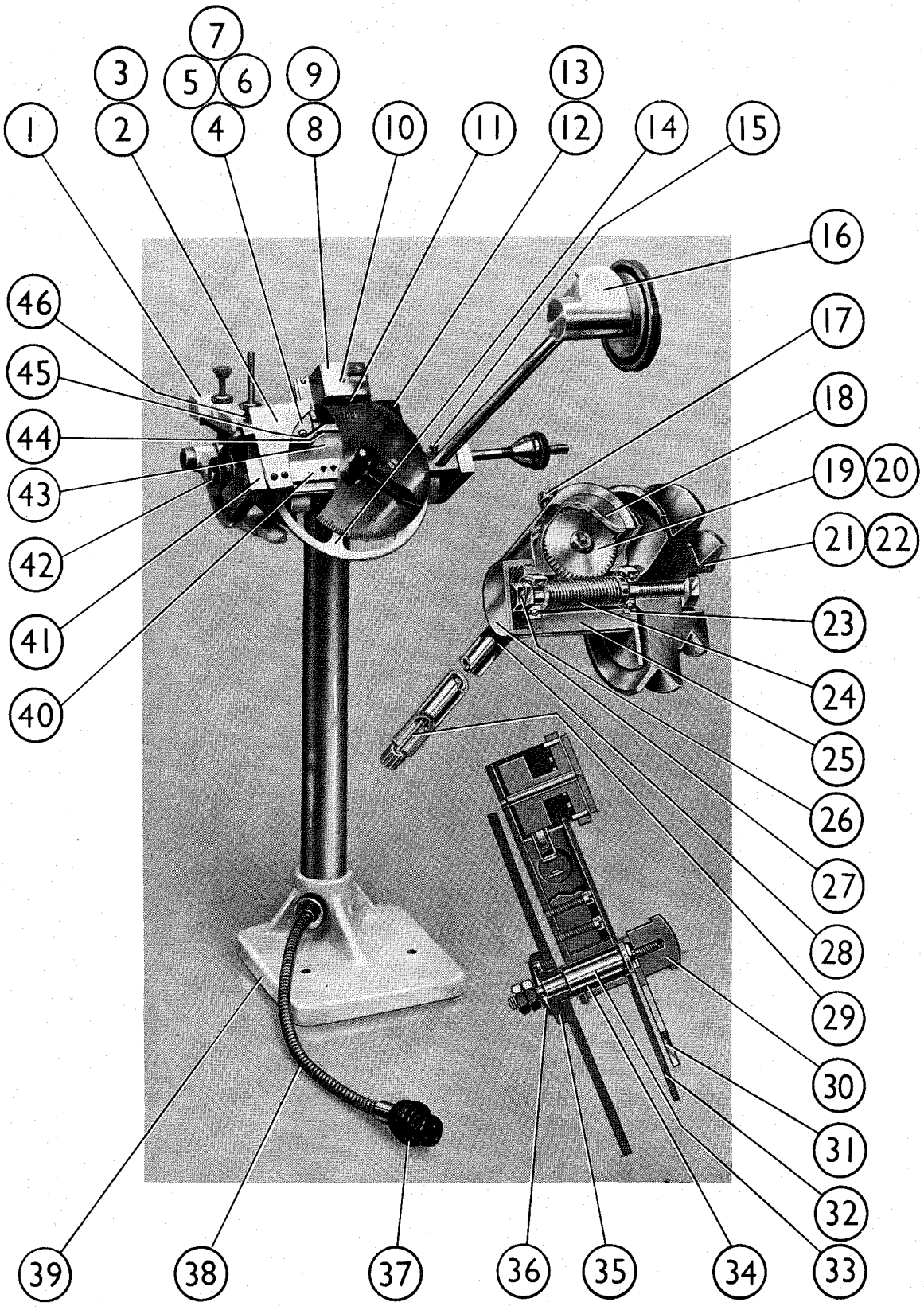
# Plate 5 — Parts List

| ITEM NO. | DESCRIPTION | PART NO. | QUAN. OFF |
|---|---|---|---|
| 1 | Reel Carrier Complete | 40428/A | |
| 2 | Connection Cover | 14061/A | 1 |
| 3 | Screw Securing Item 2 | S.615 | 2 |
| 4 | Contact Fixing Plate | 14088/2 | 1 |
| 5 | Insulating Plate | 14089/1 | 1 |
| 6 | Insulating Block | 14087/1 | 1 |
| 7 | Screws Securing Items 4, 5 and 6 | S.669 | 2 |
| 8 | Indicator Cowl | 14090/2 | 1 |
| 9 | Screw Securing Item 8 | S.676 | 4 |
| 10 | Barrel Spindle | 14091/1 | 1 |
| 11 | Barrel Indicator Assembly | 14092/A | 1 |
| 12 | Contact Cover Block | 14095/2 | 1 |
| 13 | Screw Securing Item 12 | S.677 | 2 |
| 14 | Gear Wheel | 14096/2 | 1 |
| 15 | Screw Securing Item 16 | S.456 | 1 |
| 16 | Pulley Arm Assembly | 20830/A | 1 |
| 17 | Screw Securing Item 25 | S.449 | 1 |
| 18 | Case Disc | 14097/1 | 1 |
| 19 | Worm Wheel | 14098/1 | 1 |
| 20 | Nut Securing Item 19 | N.25 | 1 |
| 21 | Yards/Feet Measure Pulley | 12618/1 | 1 |
| 22 | Metric/Yards Measure Pulley | 14086/1 | 1 |
| 23 | Ball Race | BR.8 | 2 |
| 24 | Worm Spindle | 14100/1 | 1 |
| 25 | Worm Case and Flange Assembly | 14101/A | 1 |
| 26 | Lock Nuts | N.22 | 3 |
| 27 | Grease Cap | 14102/1 | 1 |
| 28 | Pinion Gear Tube Assembly | 14103/A | 1 |
| 29 | Gear Pinion Spindle Assembly | 14106/A | 1 |
| 30 | Pointer Knob | 14109/1 | 1 |
| 31 | Dial Pointer | 14108/2 | 1 |
| 32 | Calibrated Dial | 11541/1 | 1 |
| 33 | Pointer Spindle | 14112/1 | 1 |
| 34 | Pointer Spindle Bush | 14115/1 | 1 |
| 35 | Gear Wheel Bush | 14116/2 | 1 |
| 36 | I.O.M. Washer | 12668/1 | 1 |
| 37 | Socket | 12354/1 | 1 |
| 38 | Flexible Coupling Tube Assembly | 20800/A | 1 |
| 39 | Base and Tube Assembly | 40429/A | 1 |
| 40 | Square Mounting Bar | 14124/1 | 1 |
| 41 | Distance Pieces | 14125/2 | 2 |
| 42 | Cam Spindle | 11764/2 | 1 |
| 43 | Back Plate | 14126/2 | 1 |
| 44 | Fixed Contact Assembly | 14117/A | 1 |
| 45 | Moving Contact Assembly | 14118/A | 1 |
| 46 | Return Spring for Pulley Arm | 11918/1 | 1 |

**NOTE : FOR ALL OTHER PARTS NOT SHOWN SEE PLATE 4 "DOUGLAS" STANDARD REEL CARRIER.**

# "DOUGLAS" LINEAR MEASURE REEL CARRIER

## PLATE 5.



# OTHER MACHINES IN THE "AVO" RANGE

"DOUGLAS" NO. 6
"DOUGLAS" NO. I
"DOUGLAS" NO. 3
"MACADIE" S.C
"MACADIE" T.D.S.M.
"DOUGLAS" NO. 15
"MACADIE" FULLY AUTOMATIC P.I
"DOUGLAS" H.F.
"DOUGLAS" NO. 3 EXTENDED BASE
"DOUGLAS" LARGE MULTI WINDER
"DOUGLAS" SMALL MULTI WINDER
"DOUGLAS" DUAL HEAD
"DOUGLAS" MAGNETO
"DOUGLAS" SPECIAL EXTENDED BASE NO. 6
"DOUGLAS" SPIRAL
"DOUGLAS" WAVE WINDER
"DOUGLAS" NO. 8 TAPING MACHINE
"DOUGLAS" HEAVY DUTY POWER DRIVEN
"DOUGLAS" HEAVY DUTY H.F.
"DOUGLAS" PROGRESSIVE WAVE WINDER
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